A SURVEY OF THE VASCULAR PLANTS ABOVE TIMBERLINE ON MT. HOOD, OREGON

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Introduction. To my knowledge, a survey of the vascular plants above Timberline on Mt. Hood, Oregon, has not been made previously. The colorful old Oregon botanist, Thomas Howell, published the Flora of Mt. Hood in the Mazama's Magazine in 1896 (Howell, 1896) but in this article no differentiation was made between the plants above and below the Timberline. Mr. Howell's article came as a result of previous work done in the Mt. Hood area with Suksdorf, another famous northwest botanist, and subsequently appeared in the records of congress in 1930 as the only available list, although incomplete, of the flora of the Mt. Hood area (Lange, 1953).

The nearly 70 years since Mr. Howell's study have wrought changes as shown by the differences in some of the species found.

Geography. Mt. Hood is situated a little east of the middle of the Cascade range of mountains. It is approximately 22 airline miles south of the Columbia River, 50 miles ESE of the city of Portland, 29 miles SW of The Dalles and 70 miles NW of Bend. Highway access is U.S. 26 from Portland or Bend and by State Highway 35 from Hood River. These two roads form a loop highway on the south and east side of the mountain at an average of 4000 ft. elevation. There is no heavy duty road on the west or north sides but a maze of all weather roads traverses these areas to about 4000 ft. Many improved forest service trails make walking access to many outstanding scenic locations easy and enjoyable.

Geology. The mountain is situated in a belt of volcanic activity (Wise, 1964) which has been progressing for many years beginning with the extrusion of the Miocene Columbia River basalt over a wide plateau encompassing northern Oregon and southern Washington. Later (about 15 million years ago) olivine basalt and some andesite erupted from many centers throughout the length of the Cascade range building cones up to 6500 feet in elevation. Some of this activity has continued until the present. In recent times (ending about 10 to 15 thousand years ago) the Mount Hood Volcano, through a series of eruptions and extrusions, built the cone. Subsequently, a large glacier formed in the crater, spilled over the south rim, and eroded the south face of the mountain including the major part of the south and southwest rim. Other large glaciers formed at various positions on the mountain eroding the ash and detritus and in places leaving remnants of thicker lava flows. These glaciers have been a major factor in reducing the original cone's height by nearly a thousand feet and creating varied scenery which is unexcelled.

Survey limits. A topographic map of the mountain is included with this paper showing general areas and limits of the survey. The exact

limits of Timberline are difficult to pinpoint on a large area such as Mt. Hood. The actual line of demarcation of moderate timber is approximately 6500 feet. This is probably 1000 feet lower than the normal timberline for this climate and general edaphic factors would dictate. The major cause of this discrepancy is the rapid erosion taking place on the surface. Glaciation and running water are moving the mountain away faster than the slowly developing trees can establish themselves. Evidence for this is the fact that the trees are growing at higher elevations on the ridges than in the valleys where major erosion factors are progressing.

Timberline is defined here as the approximate route of the Timberline Trail excepting the White River area and the entire west side where it dips considerably below Timberline to facilitate crossing rugged and dangerous canyons and cliffs. In many specific localities the trail traverses timberlands. Where this occurs the survey includes only the plants above the actual timberline. Three trees, *Tsuga mertensiana, Abies lasiocarpa* and *Pinus albicaulis,* are included because their range extended, on many ridges, to over 8000 feet.

Methods and Results. Several trips were made to six different areas on Mt. Hood (fig. 1) from July, 1965 through Sept. 1966. Specimens on which this report is based are in the Dudley Herbarium of Stanford University with the exception of that of *Polygonum minimum* which is at Washington State University and was kindly determined by Marion Ownbey. Subsequent collections will probably increase the number of species on Mt. Hood.

Two ascents were made to the summit. These are not included in the general areas because no specimens were taken. These trips were made to find the extremes that any plants were growing, and to search for and collect any that were higher in elevation than the regular areas covered. Both ascents were made up the south side. One of the highest plants found on these trips was a small clump of *Sedum divergens* growing from a crevice in a large andesitic rock at approximately 9500 feet, west of the White River glacier, just below Crater Rock. Interestingly enough, this same species was found blossoming beneath an inch of clear ice on the edge of Eliot glacier, east of Pulpit Rock on the north side of the mountain.

Spraguea umbellata was also found at about the 9500 ft. elevation. At this extreme altitude the plant was small and the blossoms were growing right on the ground. *S. umbellata* was not found on the north side of the mountain; however, *Hydrophyllum capitatum* seemed to fill the approximate niche there. *Sitanion hystrix, Trisetum spicatum, Penstemon menziesii, Juncus parryi, Solidago spathulata, Anemone drummondii* and *Collomia larsenii* were all found growing at high altitudes. *Lupinus lyallii, Phlox diffusa* and *Polygonum newberryi* were some of the most abundant and were distributed over a wide range. The other extreme was *Collomia larsenii,* of which only a few plants were found

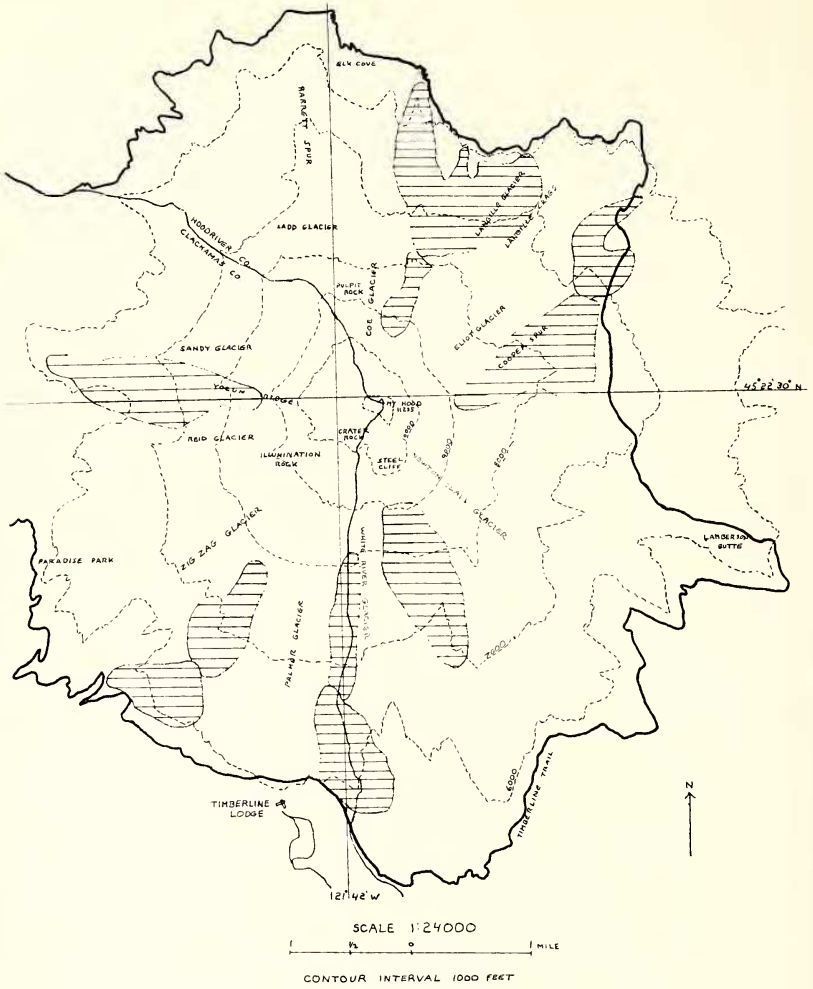

FIG. 1. Mt. Hood, Oregon. Hatching indicates areas collected.

and those were in a very restricted habitat.

Many ecotonal species are included which do not occur at any appreciable distance above the actual timberline. However, if one plant was found on the upper side of the trail, when the trail was distinctly out of the timber, it was included.

In all, the flora consists of 28 families, 56 genera and 82 species. The following list uses the nomenclature and arrangement to be found in Peck's *Manual* (1961).

Pinaceae. *Pinus albicaulis* Engelm., *Tsuga mertensiana* (Bong.) Sarg., *Abies lasiocarpa* (Hook.) Nutt.

Cupressaceae. *Juniperus sibirica* Burgsd.

Gramineae. *Bromus breviaristatus* Buckl., *Festuca viridula* Vas., F. *ovina* L., *Sitanion hystrix* J. G. Sm., *Trisetum spicatum* (L.) Richt., *Deschampsia atropurpurea* (Wahl.) Scheele, *Phleum alpinum* L., *Stipa occidentalis* Thurb., *Agrostis humilis* Vas., A. *diegoensis* Vas.

Cyperaceae. *Elyna bellardii* (All.) Degl., *Carex straminiformis* Bail., *C. ablata* Bail.

Juncaceae. *Juncus parryi* Engelm., *J. drummondii* E. May., *J. mertensianus* Bong., *Luzula spicata* (L.) DC.

Liliaceae. *Erythronium montanum* Wats., *Calochortus elegans* Pursh.

Orchidaceae. *Spiranthes romanzoffiana* Cham.

Salicaceae. *Salix comutata* Bebb, *S. pennata* Ball.

Polygonaceae. *Polygonum bistortoides* Pursh, *P. newberryi* Small, P. *minimum* Wats., *Eriogonum marifolium* T. & G., *E. ovalifolium* Nutt.

Portulacaceae. *Spraguea umbellata* Torr.

Caryophyllaceae. *Stellaria umbellata* Turcz., *Arenaria obtusiloba* (Rydb.) Fern., *Silene suksdorfii* Robins.

Ranunculaceae. *Anemone occidentalis* Wats., *A. drummondii* Wats., *Ranunculus eschscholzii* Schlecht.

Crassulaceae. *Sedum divergens* Wats., *S. debile* Wats.

Saxifragaceae. *Saxifraga caespitosa* L.

Grossulariaceae. *Ribes acerifolium* How.

Rosaceae. *Sorbus occidentalis* (Wats.) Greene.

Leguminosae. *Lupinus lyallii* Gray, *L. suksdorfii* Robins., *L. alpicola* Hend., *L. arcticus* Wats. var. *subalpinus* (Robins.) C. P. Sm.

Hypericaceae. *Hypericum anagalloides* C. & S.

Onagraceae. *Epilobium hornemannii* Reich.

Umbelliferae. *Lomatium angustatum* (C. & R.) St. John.

Ericaceae. *Phyllodoce empetriformis* (J. M. Sm.) D. Don, *P. glanduliflora* (Hook.) Cov., *Cassiope mertensiana* (Bong.) G. Don, *Vaccinium membranaceum* Dougl.

Gentianaceae. *Gentiana calycosa* Griseb.

Polemoniaceae. *Phlox diffusa* Benth., *Collomia larsenii* (Gray) Pays., *Polemonium californicum* Eastw.

Hydrophllaceae. *Hydrophyllum capitatum* Dougl.

Scrophulariaceae. *Penstemon menziesii* Hook., *P. euglaucus* English, *Veronica arvensis* L., *V. alpina* L., *Mimulus lewisii* Pursh, *M. tilingii* Reg., *Castilleja suksdorfii* Gray, *C. hispida* Benth., *C. oreopola* Greenm., *Pedicularis racemosa* Dougl.

Caprifoliaceae. *Lonicera involucrata* (Rich.) Banks.

Valerianaceae. *Valeriana sitchensis* Bong.

Compositae. *Haplopappus bloomeri* (Hook.) Gray, *Solidago spathulata* DC., *Aster alpigenus* (T. & G.) Gray, *A. campestris* Nutt., *Erigeron poliospermus* Gray, *Anaphalis margaritaceae* (L.) B. & H., *Antennaria media* Greene, *Achillea lanulosa* Nutt., *Raillardella scaposa* Gray, *Arnica latifolia* Bong., *Senecio triangularis* Hook., *Agoseris alpestris* (Gray) Greene.

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Literature Cited

Howell, T. J. 1896. The flora of Mt. Hood. Mazama 1:28–48.

Lange, E. F. 1953. Thomas J. Howell, pioneer Oregon botanist. Sci. Month. 77:199–204.

Peck, M. E. 1961. A manual of the higher plants of Oregon. Binfords & Mort, Portland.

Wise, W. S. 1964. The geologic history of Mt. Hood, Oregon. Mazama 46:13–22.

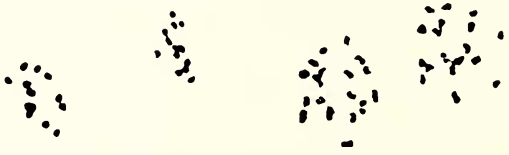
DOCUMENTED CHROMOSOME NUMBERS OF PLANTS

(See Madroño 9:257–258; 17:255. 1964.)

Astragalus sclerocarpus Gray. **n = 11.** Washington, Adams Co., Sand Dunes State Park. *R. Spellenberg 1420,* WTU.

Bomarea hirtella (HBK.) Herb. **2n = 18_{II}.** Mexico, Chiapas, Municipio of Pueblo Nuevo Solistahuacán. *S. S. Tillett 636–3,* D.S. Counted by Marion S. Cave. Approximately 5% of the pollen mother cells had 1 bridge with associated fragment, and 1 cell had 2 bridges and fragments, suggesting the presence of two paracentric inversions in this plant. This is apparently the first report of a tetraploid in the genus.

Cicendia quadrangularis (Lam.) Griseb. (*Microcala quadrangularis* (Lam.) Griseb.) **n = 13.** California, Contra Costa Co., Richmond, *D. M. Post 125,* UC; near Giant. *D. M. Post 126,* UC. The more familiar generic name *Microcala* is apparently invalid due to its being superfluous when published. Fig. 1 shows a microsporocyte at metaphase II of meiosis.



Figs. 1, 2. 1, *Cicendia quadrangularis,* left; 2, *Exacum affine,* right.

Cleomella macbrideana Payson. **2n = 17_{II}.** Idaho, Lehmi Co., 12 mi SE of Salmon. *G. A. Mulligan* and *C. Crompton 2961,* DAO. Counted by G. A. Mulligan.

Eriocaulon compressum Lam. **n = 20.** Florida, Levy Co., near Bronson, *I. L. Wiggins 19220,* DS. Counted by Marion S. Cave.

Eriogonum alatum Torr. var. *alatum.* **n = 20.** Utah, Carbon Co., Tavaputs Plateau. *N. H. Holmgren et al. 1961,* NY, UTC; Kane Co., Kaiparowits Plateau. *N. H. Holmgren et al. 2070,* NY, UTC. Counted by J. L. Reveal.

E. anemophilum Greene. **n = 20.** California, Mono Co., Sonora Pass. *J. L. Reveal & J. A. Reveal 491,* UTC. Counted by J. L. Reveal.

E. arborescens Greene. **n = 20.** California, San Bernardino Co., Rancho Santa Ana Botanic Gardens, #1560. *L. L. Kistler s.n.,* UTC. Cultivated. Counted by J. L. Reveal.

E. caninum (Greene) Munz. **n = 12.** California, Marin Co., Tiburon. *D. L. Breedlove 4965,* UTC. Counted by J. L. Reveal.

E. cinereum Benth. **n = 40.** California, Los Angeles Co., near Malibu. *N. H. Holmgren & J. L. Reveal 2616,* NY, UTC. Counted by J. L. Reveal.

E. compositum Dougl. ex Benth. var. *compositum.* **n = 20.** Oregon, Wasco Co., Tygh Valley. *P. H. Raven 18395,* UTC. Counted by J. L. Reveal.